

UNIVERSITY DEPARTMENT OF PHYSICS

Dr. Shyama Prasad Mukherjee University, Ranchi

M.Sc. Physics

Semester-II

Paper- 202

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Group: A

**Short answer type**

1. Explain wave motion in Monoatomic and Diatomic Lattice vibrations.
2. What is Semiconductor? Explain its types with band structure.
3. Explain Diamagnetism and Para Magnetism in solids.
4. Discuss the Fermi level and Density of state in Semiconductor.
5. Derive an Expression for the carrier concentration in Intrinsic Semiconductor.
6. What are Phonon, Explain Phonon Frequency and density of state?
7. What is Meissner effect? Explain type I and type II semiconductors.

**Group:B**

**Long answer type**

1. Discuss the Quantum Theory of Ferromagnetic solids.
2. a. Derive an Expression for London's Equation.  
b. What is Effective mass of  $e^-$  or hole derive its expression.
3. a. Explain BCS Theory of Superconductors and derive expression for Super Conductivity Energy Gap.  
b. Derive and explain Law of Mass Action in Semi-Conductors
4. Discuss the Debye's Theory of Solid State Physics in Detail.
5. Discuss the Thermal Expansion and Thermal Conductivity of solids
6. Discuss the Quantum theory of Diamagnetism in Solid State Physics.
7. Explain Kronig-penny model and derive Relation between Energy and Momentum.

